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54 **Cleaning compositions with short chain nonionic surfactants.**

57 The present compositions comprise short chain alkoxylated alcohols as nonionic surfactants. The short chain alkoxylated alcohols provide superior cleaning compared to their homologues with longer chains as well as other benefits including, low foaming and skin mildness, and the ability to formulate concentrated compositions.

**EP 0 616 028 A1**

Technical field

The present invention relates to cleaning compositions. Although the present invention applies primarily to hard surface cleaning compositions, it may also be of interest for other cleaning compositions including dishwashing and laundry detergent compositions.

Background

A variety of cleaning compositions have been described in the art. There is a constant strive for the development of cleaning compositions with better performance in several respects. Better cleaning on all soils, including greasy soils and soap scum is of course a principal object, both for neat and diluted compositions which are often used in the cleaning of hard surfaces. However other properties are also highly desirable, particularly mildness to the skin, the ability to remove soap scum and to produce limited suds.

All such objects can be independently achieved by using various ingredients which are generally added for a specific purpose. For instance silicone oils are typically added solely to control sudsing. Another example is the use of solvents to boost neat cleaning. While such additives meet the desired object, they also grief the cost of formulating efficient cleaning compositions.

It has now been found that certain nonionic surfactants, namely alkoxyated alcohols with a short alkyl chain in the alcohol, hereinafter short chain alkoxyated alcohols, meet the above objects. Indeed, it has been found that said short chain alkoxyated alcohols are particularly efficient in cleaning. Such short chain alkoxyated alcohols further meet the other objects of providing surfactants which are low foaming and which are mild to the skin. Another advantage is that such short chain alkoxyated alcohols are particularly suitable for formulating concentrated cleaning compositions.

EP 125 854 discloses a composition comprising 2.7% of C8EO4.8 together with 14.2% of ammonium C11.8 linear alkyl benzene sulphonate, 10.4 of ammonium C12-13 alkyl ethoxylated sulphate, 8.6% magnesium C12-13 alkyl sulphate, 4.0% coconut monoethanolamide and 9.1% ethanol and water. EP 125 854 however fails to draw the difference between long and short chain nonionic surfactants.

EP 496 188 discloses an aqueous solution comprising 3% of C8EO6 and 8% maleic acid. EP 486 188 does not draw the difference between long and short chain nonionic surfactants.

Summary of the invention

The present invention encompasses aqueous cleaning compositions comprising a short chain alkoxyated alcohol surfactant according to the formula  $RO(A)nH$ , wherein R is a C6 to C10 hydrocarbon chain, A is ethylene oxide or propylene oxide or mixtures thereof and n is of from 1 to 10, or mixtures thereof, and other conventional cleaning ingredients selected from anionic, cationic, zwitterionic and nonionic co-surfactants, including short chain co-surfactants, builders, solvents, bleaches and minors including dyes, perfumes, or mixtures thereof.

The present invention also encompasses such compositions in a concentrated form, the use of said surfactants for neat grease cleaning, for dilute grease cleaning and for soap scum cleaning. The present invention further encompasses the use of said surfactants as skin mild surfactants and as low foaming surfactants.

Detailed description of the invention

In a main embodiment, the present invention encompasses aqueous compositions which comprise conventional cleaning ingredients and a short chain alkoxyated alcohol surfactant.

The short chain nonionic surfactants for use herein are alkoxyated alcohols according to the formula  $RO(A)nH$ , wherein R is a C6 to C10 hydrocarbon chain and n, representing the average alkoxylation degree, is from 1 to 10, or mixtures thereof. R is indifferently straight or branched. A is ethylene oxide or propylene oxide or mixtures thereof. Similar nonionic surfactants which have longer R groups than those of the present invention are known in the art and are commonly used in cleaning compositions. The present invention is based on the finding that alkoxyated alcohols with shorter R groups provide better cleaning, as well as the multiple benefits described herein.

Suitable surfactants for use herein can be readily made by condensing alcohols having the desired chain length with propylene or ethylene oxide, or mixtures thereof, as disclosed in the art for alkoxyated alcohols with longer chains. Suitable short chain alkoxyated alcohols for use herein are also commercially

available from several suppliers, for instance Dehydol 04  $\text{\textcircled{R}}$  from Henkel (C8EO4), Mergital C4  $\text{\textcircled{R}}$  from Sidobre (C8EO4), and Imbentin AG/810/050 and AG/810/080  $\text{\textcircled{R}}$  from Kolb (respectively C8-10EO5 and C8-10EO8).

The compositions according to the present invention comprise from 0.1% to 50% by weight of the total composition of said short chain alkoxyated alcohols, preferably from 1% to 30%, most preferably from 1.5% to 20%.

The short chain alkoxyated alcohols herein are particularly suitable for the formulation of so-called concentrated cleaning compositions. Indeed, the short chain alkoxyated alcohols have a very high solubility in water, but they are also able to solubilize other conventional organic ingredients for cleaning compositions, such as perfumes. Thus, in an embodiment of the present invention, cleaning compositions are provided in a concentrated form, which only comprise from 1% to 80% by weight of the total composition of water, preferably from 30% to 70%. Such compositions typically comprise from 0.1% to 50% by weight of the total composition of said short chain alkoxyated alcohols, preferably from 5% to 30%.

Some of said short chain alcohol ethoxylates have been found to provide superior neat grease cleaning, compared to other alcohol ethoxylates with longer chains. Thus, in another embodiment, the present invention encompasses the use of said surfactants for neat grease cleaning. As used herein, neat grease cleaning means the cleaning of greasy soils, using an aqueous solution comprising at least one of the surfactants according to the present invention, within the ranges above. Greasy soils are typically found in kitchens or bathrooms.

For use in neat cleaning, and when R is in the higher range, i.e. 10, it is preferred to use lower ethoxylation degrees, typically 1 to 6. Preferred short chain alkoxyated alcohols for use in neat grease cleaning are those according to the formula hereinabove where R is a hydrocarbon chain from C6 to C8 and n is from 1 to 10. Preferred short chain alcohol ethoxylates for neat grease cleaning are the surfactants according to the formula above where R is a C6 hydrocarbon chain and n is 4 or 6 (C6EO4 and C6EO6); or R is a C8 hydrocarbon chain and n is 4 or 6 (C8EO4 and C8EO6); or R is a C8 hydrocarbon chain and n is 10 (C8EO10).

Some of the short chain alcohol ethoxylates herein have also been found to provide superior dilute grease cleaning, compared to solvents. Therefore, in a further embodiment, the present invention encompasses the use of said surfactants for dilute grease cleaning. As used herein, dilute grease cleaning means the cleaning of greasy soils using an aqueous solution comprising a surfactant according to the present invention, in the ranges described above, but which is diluted typically in 10 to 150 times its weight in water before it is used to clean the greasy soils. Dilute cleaning compositions and conditions have been described for instance in EP 503 219.

Suitable short chain alkoxyated alcohols for use in dilute grease cleaning are those according to the formula hereinabove where R is a hydrocarbon chain from C8 to C10, and n is from 1 to 10. For dilute cleaning, it has been found that for a given R group, it is preferred to use higher ethoxylation degrees. Preferred short chain alkoxyated alcohols herein for dilute grease cleaning are those according to the formula hereinabove where R is a C8 hydrocarbon chain and n is of from 4 to 10, preferably 4, 6 or 10 (C8EO4, C8EO6, C8EO10), R is a C10 hydrocarbon and n ranges from 3 to 6 or n is 10 (C10EO3, C10EO4, C10EO5, C10EO6, C10EO10), as well as a mixture of surfactants where R is a C10 hydrocarbon and a C8 hydrocarbon and n is 5 (C8-10EO5), or n is 8 (C8-C10EO8).

Furthermore, some of the short chain alcohol ethoxylates herein have been found to be particularly efficient in cleaning soap scum, compared to other alkoxyated alcohols with longer chains. Accordingly, in a further embodiment, the present invention encompasses the use of said surfactants for cleaning soap scum. Soap scum, which is mainly found in bathroom is quite peculiar in its composition and traditionally leads detergent manufacturers to formulate specialty cleaning products for bathroom environment. The present invention is thus particularly applicable to the formulation of such specialty products.

Suitable short chain alkoxyated alcohols for use in cleaning soap scum are those wherein, in the formula hereinabove, R is a hydrocarbon chain from C8 to C10, and n is from 1 to 10. When R is in the higher range, i.e. towards 10, it is preferred to use lower ethoxylation degrees, typically 1 to 6. Preferred alkoxyated alcohols for cleaning soap scum are those where, in the formula hereinabove, R is a C8 hydrocarbon chain and n is of from 4 to 10, preferably 4, 6 or 10 (C8EO4, C8EO6, C8EO10), R is a C10 hydrocarbon and n ranges from 3 to 6 (C10EO3, C10EO4, C10EO5, C10EO6), as well as a mixture of surfactants where R is a C10 hydrocarbon and a C8 hydrocarbon and n is 5 (C8-10EO5), or n is 8 (C8-C10EO8).

Furthermore, some of the short chain alcohol ethoxylates herein have been found to be of particular interest as they produce very limited sudsing or foaming compared to other alcohol ethoxylates. Accordingly, in a further embodiment, the present invention encompasses the use of said surfactants as low

foaming surfactants. Low foaming surfactants are usually of interest for heavy duty laundry detergents, but also for hard surface cleaners which are designed to be used as no-rinse products in dilute form.

The surfactants within the present invention which have been found to produce low foaming are those according to the formula herein above where R is a C6 to C10 hydrocarbon chain and n is of from 1 to 10. Preferred low foaming surfactants herein are those where R is a C6 hydrocarbon chain and n is 4 or 6 (C6EO4, C6EO6); or R is a C8 hydrocarbon chain and n is 4, 6 or 10 (C8EO4, C8EO6, C8EO10), R is a C10 hydrocarbon and n ranges from 3 to 6 (C10EO3, C10EO4, C10EO5, C10EO6), as well as a mixture of surfactants where R is a C10 hydrocarbon and a C8 hydrocarbon and n is 5 (C8-10EO5), or n is 8 (C8-10EO8); or mixtures thereof.

Furthermore, some of the short chain alcohol ethoxylates herein have been found to be of particular interest as they are particularly mild to the skin. Accordingly, the present invention encompasses the use of said surfactants as skin mild surfactants. Mildness to the skin is quite an advantage when formulating products which are bound to be in contact with the user's skin. Such is the case for dishwashing compositions, or hard surface cleaning compositions. Skin mildness benefits are usually advertised when they exist in a given product.

The surfactants within the present invention which have been found to be particularly mild to the skin are those according to the formula herein above where R is a C6 to C8 hydrocarbon chain and n is of from 1 to 10. Preferred surfactants are those where R is a C6 hydrocarbon chain and n is 4 or 6 (C6EO4, C6EO6), or R is a C8 hydrocarbon chain and n is 4, 6 or 10, or mixtures thereof (C8EO4, C8EO6, C8EO10).

The compositions according to the invention further comprise conventional ingredients selected from other nonionic, anionic, cationic and zwitterionic co-surfactants (from 0% to 30% by weight of the total composition, preferably from 1% to 20%), builders (from 0% to 20% by weight of the total composition, preferably from 1% to 10%), solvents (from 0% to 20% by weight of the total composition, preferably from 0% to 5%), non-hypochlorite bleaches (from 0% to 10% by weight of the total composition, preferably from 1% to 5%) and minors including dyes, perfumes, all of which are well known and extensively described in the art.

The exact formulation of the compositions according to the present invention depend on the end-use envisioned. Mixtures of the short chain surfactants according to the present invention can also be used in order to combine several benefits. Compositions according to the present invention can be formulated indifferently as alkaline and acidic hard surface cleaners, dishwashing products or laundry detergents.

The present invention will be further illustrated by the following examples.

#### Examples

The following compositions are made by mixing the listed ingredients in the listed proportions.

Ingredients:	Weight %				
	1	2	3	4	5
C8EO4	2.5	-	2.0	4.0	20
C8EO10	-	4.0	-	-	-
Lutensol AO30 ®	-	-	-	2.0	20
Lutensol AO7 ®	-	-	-	1.0	-
Na Paraffin Sulfonate	-	-	-	3.0	-
Fatty Acid	-	-	-	0.4	-
Citric Acid	5.5	5.5	3.0	2.0	3
Triethanolamine	1.9	1.9	-	1.0	-
MEA up to pH	-	-	-	-	7
Ammonia up to pH	3.5	3.5	2.0	-	-
NaOH up to pH	-	-	-	10.5	-
Water and minors	-----up to 100% -----				
Lutensol AO30 is C13-15(EO)30					
Lutensol AO7 is C13-15(EO)7					
MEA stands for monoethanolamine.					

Compositions 1 and 2 hereinabove are particularly efficient in removing soapscum and are therefore particularly suitable as a bathroom cleaner. Composition 3 is particularly effective in providing low suds. Composition 4 is particularly effective on dilute and neat grease cleaning. Composition 5 is a concentrated composition.

## Claims

1. An aqueous cleaning composition comprising a nonionic surfactant and conventional cleaning ingredients selected from anionic, cationic, zwitterionic and nonionic co-surfactants, builders, solvents, bleaches and minors including dyes, perfumes, or mixtures thereof, characterized in that said nonionic surfactant is a short chain alkoxyated alcohol according to the formula  $RO(A)nH$ , wherein R is a C6 to C10 hydrocarbon chain, A is ethylene oxide or propylene oxide, and n is from 1 to 10, or mixtures thereof, with the exclusion of compositions comprising 8% maleic acid and 3% of said short chain nonionic surfactant where R is C8 and n is 6, and with the exclusion of composition comprising 2.7% of said short chain surfactants wherein R is C8 and n is 4.8 and 14.2% of ammonium C11.8 linear alkyl benzene sulphonate and 10.4 of ammonium C12-13 alkyl ethoxylated sulphate and 8.6% magnesium C12-13 alkyl sulphate and 4.0% coconut monoethanolamide and 9.1% ethanol and water.
2. A composition according to claim 1 which comprises from 0.1% to 50% by weight of the total composition, preferably from 1% to 30%, most preferably from 1.5% to 20% of said short chain alkoxyated alcohol, or mixtures thereof.
3. A composition according to claims 1 and 2 which is in a concentrated form in that it comprises only from 30% to 70% by weight of the total composition of water, and from 5% to 30% by weight of the total composition of said short chain alkoxyated alcohol.
4. The use of a short chain alkoxyated alcohol according to the formula  $RO(A)nH$ , wherein R is a C6 to C8 hydrocarbon chain, A is ethylene oxide or propylene oxide, and n is from 1 to 10, or mixtures thereof, for neat grease cleaning.
5. The use of a short chain alkoxyated alcohol according to the formula  $RO(A)nH$ , wherein R is a C6 to C8 hydrocarbon chain and n is from 1 to 10, or mixtures thereof, as skin mild surfactants.
6. A composition or use according to the preceding claims wherein in said formula, R is 6 and n is 4 or 6 (C6EO4 and C6EO6); or R is 8 and n is 4 or 6 or 10 (C8EO4, C8EO6 and C8EO10); or mixtures thereof.
7. The use of a short chain alkoxyated alcohol according to the formula  $RO(A)nH$ , wherein R is a C6 to C10 hydrocarbon chain and n is from 1 to 10, or mixtures thereof, as low foaming surfactants.
8. A composition according to claims 1-3 or use according to claim 7 wherein, in said formula, R is a C6 hydrocarbon chain and n is 4 or 6 (C6EO4, C6EO6); or R is a C8 hydrocarbon chain and n is 4, 6 or 10 (C8EO4, C8EO6, C8EO10), R is a C10 hydrocarbon and n ranges from 3 to 6 (C10EO3, C10EO4, C10EO5, C10EO6), as well as a mixture of surfactants where R is a C10 hydrocarbon and a C8 hydrocarbon and n is 5 (C8-10EO5), or n is 8 (C8-C10EO8); or mixtures thereof.
9. The use of a short chain alkoxyated alcohol according to the formula  $RO(A)nH$ , wherein R is a hydrocarbon chain from C8 to C10, A is ethylene oxide or propylene oxide and n is of from 1 to 10, or mixtures thereof, for dilute grease cleaning.
10. A composition according to claims 1-3 or use according to claim 9 wherein in said formula, R is a C8 hydrocarbon chain and n is of from 4 to 10, preferably 4, 6 or 10 (C8EO4, C8EO6, C8EO10), R is a C10 hydrocarbon and n ranges from 3 to 6 or 10 (C10EO3, C10EO4, C10EO5, C10EO6, C10EO10), as well as a mixture of surfactants where R is a C10 hydrocarbon and a C8 hydrocarbon and n is 5 (C8-10EO5), or n is 8 (C8-C10EO8).
11. The use of a short chain alkoxyated alcohol according to the formula  $RO(A)nH$ , wherein R is a hydrocarbon chain, A is ethylene oxide or propylene oxide and n is of from 1 to 10, or mixtures thereof,

for soap scum cleaning.

12. A composition according to claims 1-3 or use according to claim 11 wherein in said formula, R is a C8 hydrocarbon chain and n is of from 4 to 10, preferably 4, 6 or 10 (C8EO4, C8EO6, C8EO10), R is a C10 hydrocarbon and n ranges from 3 to 6 (C10EO3, C10EO4, C10EO5, C10EO6), as well as a mixture of surfactants where R is a C10 hydrocarbon and a C8 hydrocarbon and n is 5 (C8-10EO5), or n is 8 (C8-C10EO8).

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## EUROPEAN SEARCH REPORT

Application Number

EP 93 87 0050

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	EP-A-0 213 554 (HENKEL) * example 1 * * column 4, line 39 - line 57 * ---	1-4,6,8, 9,10,12	C11D1/72
D,X	EP-A-0 125 854 (PROCTER & GAMBLE) * page 10, column 7 - column 9; example 3 * ---	1,2,4,7, 9,10	
X	EP-A-0 340 704 (BASF) * examples 1-5,26-35 * ---	1-3	
X	FR-A-2 339 672 (PROCTER & GAMBLE) * page 3; example 3 * ---	1-3,8, 10,13	
X	GB-A-1 462 134 (PROCTER & GAMBLE) * example IV * ---	1,2,8, 10,12	
X	US-A-4 772 415 (D. ADONE) * column 3, line 21 - line 41 * ---	1-2,9-10	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
X	FR-A-2 207 981 (BASF) * page 9, line 18 - line 21; examples 8,9,6,13-16 * ---	1-3,5-10	C11D
X	EP-A-0 244 006 (UNILEVER) * examples * ---	1-2	
D,X	EP-A-0 496 188 (PROCTER & GAMBLE) * page 3, line 36 - page 4, line 45; examples * -----	1,11-12	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 25 AUGUST 1993	Examiner PFANNENSTEIN H.
<b>CATEGORY OF CITED DOCUMENTS</b> X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons A : member of the same patent family, corresponding document			